

# Religious and Scientific Faith in Simplicity \*

Don N. Page <sup>†</sup>

Theoretical Physics Institute

Department of Physics, University of Alberta  
Room 245B1 CEB, 11322 – 89 Avenue  
Edmonton, Alberta, Canada T6G 2G7

(2008 November 4)

## Abstract

Both religion and science start with basic assumptions that cannot be proved but are taken on faith. Here I note that one basic assumption that is rather common in both enterprises is the assumption that in comparing different hypotheses that all equally explain the observations, the simpler hypotheses are more probable (Occam’s razor or the law of parsimony). That is, explanations should be made as simple at possible (though no simpler, since then they would not explain what is observed).

---

\*Alberta-Thy-19-08, arXiv:0811.0630, paper written for the 2008 November 21-22 session of the Science and Religion group at New York University

<sup>†</sup>Internet address: don@phys.ualberta.ca

# 1 Introduction

Religion and science are two different ways of viewing the world, often seen as contradictory. Although there are indeed differences in the ontologies they consider and in the epistemologies they employ, they are both human methods of cognition that employ overlapping assumptions and methodologies. In particular, here I wish to emphasize how both religion and science share an unproved assumption in their common element of faith in simplicity, that simpler explanations for our observations are generally better. There is also the related tacit assumption that the world is at least partially intelligible.

Human beings, and indeed their biological ancestors, have long noticed that there are apparent regularities in the world. Babies notice that parents' faces appear over and over. Objects placed under a cover reappear when taken out ("object permanence"). Objects thrown up into the air fall down. The sun is observed to rise and set each day (at least if one is outside the arctic or antarctic and can see a level horizon in clear weather). Lightning is accompanied by thunder. One feels warmer standing in the sunshine. Feelings of hunger are reduced by eating food. Sex often leads to reproduction. (And by reducing venereal disease and its effects on the unborn, high fidelity leads to sound reproduction.) These and a huge host of similar appearances of regularities lie deep within the human psyche and language. Logically, things did not have to be so simple, but in fact many things appear to have lawful behavior.

The behavior of other humans (and animals) is more complicated than most of these simpler examples, but humans learned to recognize regularities there as well. Mothers will feed crying babies, so babies recognize that crying can often lead to being fed. Humans of nearly all ages recognize that they are more likely to receive something they want from someone with a smile than from someone with a frown. Even dogs learn to come to people offering food and to avoid people speaking with an angry voice.

Humans recognized that a lot of complex behavior they observed could be attributed to willful causal agents, such as other people and animals. For humans dealing with lions, it was useful to act as if the lions wanted to eat the humans. In the reverse situation, for humans dealing with prey the humans wanted to eat, it was useful to act as if the prey did not want to be killed and would escape unless

the humans sneaked up upon them. For humans seeking companionship with other humans, an isolated pillar of smoke could be interpreted as the willful action of other human agents in lighting a campfire. In less pleasant circumstances, a man seeing others rushing toward him while brandishing spears might usefully interpret this as others wishing to kill him. The assumption of willful causal agency became highly useful in trying to make sense of the world.

Some regularities in the world seem so simple, such as the fact that unsupported objects fall, that willful causal agency is probably not the first thing that comes into mind in trying to explain them. They are usually just taken to be facts about the world that need not be attributed to causal agents. Other regularities, such as being given something by another human when asked, are sufficiently complex that they are often ascribed to willful causal agency. But there are also intermediate cases, such as thunderstorms and floods, that are not so obviously simple as falling objects and yet are neither so obviously the result of willful causal agency.

Rather than ascribing separate accounts for all these activities, humans implicitly assumed simplicity in trying to minimize the number of qualitatively different accounts. Other than simple activities like falling objects that might be accepted as basic, humans tended to characterize more complex activities as all being the result of willful causal agency. This explanation is still widely accepted for human activity, but hundreds of years ago it was also widely accepted for other complex behavior such as thunderstorms and floods. These were attributed to the willful causal agency of various gods.

My claim is that in doing this, humans were not taking a perversely complex view of reality, ascribing different causes for everything, but rather they were attempting to simplify their understanding of the world by ascribing all complex behavior to one single class, willful causal agency. So I would think that the move toward a religious viewpoint, that thunderstorms, floods, etc., were caused by unseen gods, was not a move away from a search for simplicity in explanations, but rather a move toward simplicity.

Long ago many religions ascribed different willful causal agencies for different activities in the world, such as one god for thunderstorms and another for floods. However, there was a move toward a simplification of the picture by reducing the number of gods. The ultimate simplification, at least within the picture of willful causal agencies, was the development of monotheism and its view of one single God

who was responsible for everything. (I also do not want to discount the fact that the Hebrews, who were among the world leaders in developing monotheism, claimed that this was revealed to them by various religious experiences and acts in their history. If one accepts these experiences, then monotheism may be also seen as the simplest explanation of these experiences. But whatever the account, it seems that it was an underlying faith in simplicity that helped lead to the acceptance of monotheism.)

Now of course there is a strong movement, promoted by people such as Richard Dawkins, to reduce the number of gods even further, from one to zero. Indeed, much of *The God Delusion* [1] sounds like a Hebrew Old Testament prophet railing against false gods, except that Dawkins does not believe in any true God. It is certainly a matter of debate whether the simplest explanation of all that we observe is one God or zero, and I shall discuss this below. However, here I want to focus on the apparent fact that the assumption or faith in simplicity has influenced not only science but also religion.

Indeed, in the West, modern science grew out of not only the Greek rational heritage (another quest for simplicity) but also the Judeo-Christian heritage of a single God of law and order [2]. It was this religious conception of an orderly world created by one God that led to the development of science.

Although I am certainly not an expert on medieval philosophy and theology, it seems that during the medieval period the idea of God's simplicity came to the fore. A prominent example is the *Summa Theologiae* of Thomas Aquinas (c. 1225-1274) [3], who taught that God has no composition of parts.

The theological view of the simplicity of God was shortly afterward applied to the preference for the simplicity of all explanations. Although there are predecessors, this preference for simplicity is commonly attributed to William of Ockham (c. 1288-1348), an English Franciscan friar and scholastic philosopher. This principle is called Occam's razor, essentially the same as the "law of parsimony," that "entities must not be multiplied beyond necessity." Although it has always implicitly been a part of human reasoning, it has become an explicit basis for science.

Thus I would argue that faith in simplicity did not begin with modern science. It has been an implicit element of reasoning for nearly all humans. It was developed particularly explicitly within religion and theology, and then it was applied explicitly within the modern science that grew out of the Judeo-Christian religious tradition.

## 2 Simplicity within Bayesian Reasoning

A goal of science is to develop theories to explain observations. One would like to find a theory that is highly probable in view of the observations, that is, a theory  $T_i$  with high posterior probability  $P(T_i|O_j)$ , given the observation or set of observations  $O_j$  that the theory is supposed to explain. This posterior probability is given by Bayes' theorem as

$$P(T_i|O_j) = \frac{P(T_i \& O_j)}{P(O_j)} = \frac{p(T_i)P(O_j|T_i)}{\sum_k p(T_k)P(O_j|T_k)}. \quad (1)$$

where  $p(T_k)$  is the prior probability of the theory  $T_k$  and  $P(O_j|T_k)$  is the conditional probability of the observation  $O_j$  if the theory  $T_k$  is correct. A sufficiently formulated theory should, in principle, enable this conditional probability to be calculated, so logically it is part of any complete theory.

However, the prior probability  $p(T_k)$  is not part of the theory  $T_k$  itself but is the probability one would assign to the theory in the absence of any observations such as  $O_j$ . It is this probability that the theory itself cannot provide. Its assignment is essentially subjective, in that it is not objectively determined. However, the posterior probabilities for the various theories, after the observation or set of observations, depend crucially upon these prior probabilities. It is effectively here that science asserts its faith in simplicity by assigning higher prior probabilities to simpler theories. Nevertheless, one cannot prove that this should be the case or determine the prior probabilities from the observations.

To consider a simple example, consider a finite sequence of integers as an observation, and consider theories that give the rules for constructing an infinite sequence that starts with this finite sequence. For example, think of the finite sequence 1, 2, 3, 4, 5, 6, 7, 8, 9, 10. If this were to be extended to an infinite sequence, what would you say that the theory or rule is, and what numbers does it predict for the next three entries in the sequence? Perhaps most people would say something to the effect that this finite sequence is the beginning of the sequence of natural numbers, otherwise known as the whole numbers, the counting numbers, or the positive integers, with each new element in the sequence being one more than the previous one. Then the next three elements would be 11, 12, 13.

However, the finite sequence given above is also the beginning of the Niven (or Harshad) numbers [4]: numbers that are divisible by the sum of their digits. Then the next three entries would be 12, 18, 20. Alternatively, this finite sequence is the

beginning of highly composite numbers [5]: numbers whose prime divisors are all less than or equal to 7. This sequence would give the next three entries as being 12, 14, 15. Therefore, just from the observation of the first ten entries of an infinite series, one cannot definitely conclude what the entire sequence is or even what the next few entries are.

Nevertheless, probably most people would say that the sequence is the natural numbers (or words to that effect), and that the next three entries are 11, 12, 13. Why is that? I would argue that it is because the infinite sequence of natural numbers seems simpler than either the Niven numbers or the highly composite numbers. Therefore, based upon the unproved faith in simplicity, one favors the idea (assigns higher prior probability to the idea) that the infinite sequence is the natural numbers rather than the Niven numbers or the highly composite numbers.

Faith in simplicity is the basis for scientific induction, generalizing from a finite number of examples to a wider regularity. We see the sun rise for many days and form the induction that it will continue to rise day after day. We note that objects thrown into the air fall down and conclude that such objects will always fall. These inductions are certainly not logical deductions that must inevitably follow from the observations, but predictions based on a belief in simplicity. Of course, we may find that our predictions are wrong, as when we go north of the Arctic Circle at the beginning of winter, or when we use a rocket to escape the earth's gravitational field. But then we try to look for the simplest possible reasons why our original predictions failed and to look for more general simple predictions that apply even more generally.

One application of our faith in simplicity is our belief that there was an actual existent past. In some sense, all that one has direct epistemological access to is one's own conscious perception at the present. We effectively use our faith in simplicity (usually unconsciously; apparently we are just wired to think that way) to assume that the experience of an apparent memory of a past experience denotes the actual existence of that experience in the past, though each of us really has direct access only to his or her present conscious experience.

On a recent flight from Vancouver to Seoul, I flew nearly directly over an abandoned village in Alaska (Holikachuk) where I had lived from the ages of one to nine but had left just over 50 years ago and had not seen since. I was impressed with the strong correlation between my memories of the layout of the Innoko River and connecting sloughs at the village with the present appearance (now as I write this,

with my memory of the appearance from the airplane). I have no proof that this correlation within my present perception of what I interpret as memories from over 50 years ago and of what I interpret as memories from my recent airplane flight is not just some random correlation, but it is much simpler to suppose that I actually did have experiences of a river and sloughs 50 years ago and that these geological features have persisted and given me correlated visual impressions 50 years later. (Of course, the correlations are not perfect. I also spotted from the airplane the location of the bend of the river, shortly below the mouth of the Iditarod River whose name has become much more famous than it was when I lived in Holikachuk, where I first learned the distinction between left and right, but now that bend has been cut off by an oxbow, or at least that is my simple interpretation. Fortunately, my concept of left and right has been transferred to other bases and no longer relies on that bend in the river that has disappeared.)

Besides the extrapolation from present conscious experience to the assumption of the existence of the past, there is the extrapolation to the assumption that there is an external world causing much of one's conscious experience. For example, I believe the correlation between the part of my present perception that I interpret as memories of over 50 years ago in Holikachuk and the part that I interpret as memories of my recent airplane flight over Alaska is not just caused by features of my mind but is also partially caused by features in the external world, such as the general persistence of the layout of the Innoko River (other than the bend that got cut off) and the sloughs near the location of Holikachuk, and the fact that light propagates in nearly straight lines from such features and is focused by my eyes.

In addition, there is also the extrapolation from the sense that one is a willful causal agent to the belief that other willful causal agents also exist (e.g., other people), which I have mentioned above. Philosophers have noted that there is no logical proof in the existence of other minds (just as there is no proof in the existence of the past or even of an external physical world). However, to me other minds seem to be a consequence of the simplest explanation of much of my present conscious experience (though I personally might doubt that the simplest explanation of the existence of other minds, that is, of conscious experiences of others, implies that such minds are really willful causal agents in the sense of being the ultimate causes of anything, but that will be discussed later).

These examples are of beliefs that presumably most humans have held from prehistoric times, so that they are so deeply ingrained in our psyches that it is hard

to consider alternatives. However, there are more recent examples of the influence of our faith of simplicity in the area of science where it is easier to conceptualize alternative beliefs.

One example from modern science would be the formulation of Newton's law of universal gravitation, generalizing the observation of falling objects on the earth, first to the moon that falls toward the earth to orbit it rather than going off in a straight line. Then Newtonian gravity was applied to the orbits of planets around the sun, giving a simpler explanation of Kepler's laws that up to then had been the simplest description of the orbits. Furthermore, Newtonian gravity was applied to the gravitational forces between planets to explain even the small deviations from Kepler's laws that had been observed. A brilliant culmination of its power was its use to explain the motion of Uranus by the postulation of a new planet which was then discovered and named Neptune.

In the late nineteenth century it was found that even after including the gravitational attractions on Mercury from the other planets as well as from the sun (which make up the largest part of the discrepancy of its orbit from that given by Kepler's laws), its orbit did not quite fit the Newtonian prediction. Explaining this deviation correctly became a major triumph of Einstein's theory of general relativity, though that theory of gravity was formulated basically to reconcile gravitational theory with special relativity instead of specifically to solve the problem of the orbit of Mercury. Einstein's theory applied more generally than Newton's theory of gravity. Although from the viewpoint of most undergraduate mathematics it looks more complicated than Newton's theory, from a more advanced mathematical viewpoint that encompasses time as well as space in the unified structure of spacetime, Einstein's theory appears conceptually even simpler than Newton's.

Now we know that even Einstein's general relativity theory is not the last word on gravity, since it does not incorporate quantum theory, which has been very strongly confirmed for nongravitational interactions and most simply should apply to gravitation as well. It is not yet understood what a complete theory of quantum gravity is, though the partially formulated ideas of string theory at present appear to be the best candidate for such a theory (perhaps also with contributions from other approaches such as loop quantum gravity). The mathematics of what we presently know of string theory looks very forbidding, so I am not sure that there is any person on earth (well, possibly Edward Witten is an exception) for whom string theory looks simpler than general relativity, but I think a hope of many physicists is that

with sufficiently sophisticated mathematics, string theory might ultimately be seen as simpler than general relativity (or at least simpler than general relativity plus quantum theory, which at present we do not know how to reconcile).

These examples can also be used to illustrate that the preference for simplicity should only be applied to different theories that explain the same set of observations, and ultimately we would like theories that explain as much as possible. If one only looks at how an object falls at one location on earth, it is simplest to say that it experiences a downward gravitational force equal to its mass multiplied by the local acceleration of gravity,  $F = mg$ . If one looks at a large (non-quantum) objects moving much slower than the speed of light at an arbitrary location in a general gravitational field that is too weak to cause anything to move close to the speed of light, one cannot just use  $F = mg$  with a constant  $g$ , and then it seems simplest to use Newton's law of gravitation. If one sticks to non-quantum objects and sources of the gravitational field but allows speeds close to the speed of light and/or gravitational fields strong enough to cause objects to move at such high speeds, then Newton's theory is not accurate, and the simplest theory that appears to be accurate is Einstein's theory of general relativity. If one goes further to quantum sources of the gravitational field, then general relativity is also not applicable, and then the simplest theory is not yet known but might be some completion of something like string theory.

At present, since we do not fully understand string theory or any other candidate theory of combining quantum theory and all the known interactions (including gravity), we use a hodge-podge of ideas, such as general relativity for gravity and quantum field theory for other known interactions (e.g., electromagnetism, weak interactions, and strong interactions). Besides the fact that we do not know how to apply the hodge-podge consistently to all conceivable situations (particularly to the beginning of the universe and to the complete Hawking evaporation of black holes), we recognize that the hodge-podge is conceptually not very simple, so we desire a simpler unifying theory.

Another point to be made is that the simplicity desired is in the basic principles of the fundamental formulation, not in the simplicity of being able to calculate the consequences easily. In astronomy, the Ptolemaic system was a remarkably brilliant method of calculating most of the motion of the planets to as much accuracy as was generally needed to explain the naked-eye observations, at least before Tycho Brahe's careful observations that were the most precise before the invention of the

telescope. As I understand it, the calculations were actually harder to make using Kepler's laws, but even without the improvement that it gave to explain some of Tycho's crucial observations, it was conceptually much simpler than the Ptolemaic system. (That system turned out with hindsight to be a very good approximation to Kepler's laws, but when it was formulated, the conceptually simpler Keplerian laws were not known, so the approximation to them was cleverly discovered before the conceptually simpler generalization.) Even before Kepler found his laws that fit the new data of Tycho Brahe better than the Ptolemaic system, some, but not all, astronomers had turned to the Copernican system for its greater conceptual simplicity over the Ptolemaic system, even though with its originally circular orbits it did not actually fit the data nearly so well as the Ptolemaic system.

Somewhat analogously, when one went from Kepler's laws to Newton's, one gained the conceptual simplicity of being able to derive all three of Kepler's laws from one inverse-square acceleration of each planet toward the sun, but when one included the further consequence that there are also forces between the planets, the calculations became much harder than that needed with Kepler's laws (themselves harder for manual calculations than the calculations in the Ptolemaic system). Indeed, for centuries it was not known whether an idealized Solar System of point masses for the sun and planets is stable or not in Newton's theory. Newton thought that it wasn't stable and invoked God to set things aright, and Laplace erroneously thought he had proved it was stable and said he had no need for the hypothesis of God. In the 20th century numerical calculations strongly suggest, without being quite a proof, that the Solar System is not stable but is just old [6], so that the objects with shorter timescales for their instabilities have been ejected, leaving objects that are relatively stable for timescales longer than the finite age of the Solar system.

Similarly, when one went from Newton's laws to Einstein's, one gained a conceptual simplicity of being able to derive gravitation from the curvature of spacetime, rather than by postulating forces acting at a distance, but the calculations became even more difficult. People are just beginning to gain enough computer power and skills to calculate how much energy is radiated in gravitational waves as two black holes spiral together and coalesce. When one makes the further move from Einstein's general relativity to string theory, no one is even close to being able to make the calculations in most situations, such as precisely what happens in the final stages of the Hawking evaporation of a black hole.

Now there is growing evidence that string theory may lead to a huge landscape of perhaps  $10^{100}$ – $10^{10\,000}$  different ‘vacua,’ different effective low-energy laws of physics [7, 8, 9]. These different vacua are analogous to the DNA for different living organisms. They set limits but do not determine what happens, which also requires the initial conditions (or the quantum state of that vacuum), just as an organism is not completely determined by its DNA but also has environmental influences. The conjecture is that the full quantum state of the entire universe would not be concentrated on a single vacuum but would be spread over most or all of this landscape, populating it with a multiverse of actual vacua or subuniverses. If this is indeed the correct picture, each individual vacuum might be rather complex (e.g., requiring at least 100–10 000 digits to specify), but the entire string theory and quantum state that determines the properties of the entire multiverse might be much simpler.

An analogy to such a multiverse might be the set of all natural numbers (the counting numbers or positive integers), which is in its entirety conceptually a very simple set, but nearly all of its individual members are very large and very complex integers. For example, if any long and complex book (or even a whole library of books) is encoded into binary digits and then this sequence of binary digits is re-interpreted as a binary integer, one would have encoded the book or library into this single integer, which is much more complex than the set of all integers. These examples show that it is easy for the whole to be simpler than the parts. (When the whole is very simple, as it is for the set of all natural numbers and as it might be for the entire quantum state of the universe, then the complexity of each part would largely lie in the complexity of the specification of the choice of that part out of the whole.)

A theistic analogue of the putative simplicity of the entire universe would be the medieval concept that God is a simple being who is omniscient and omnipotent. Almost all of the individual things God knows and can do may be extremely complex, but the knowledge of all truth, and the ability to do anything not logically inconsistent, may be considered to be quite simple. I believe the current quest for ultimate simplicity in our scientific theories is highly analogous to the medieval desire for ultimate simplicity in the concept of God.

### 3 The Complexity and Probability of God

Richard Dawkins, in *The God Delusion* [1], argues against the existence of God by saying that God would have to be extremely complex. Since his arguments are not very tightly stated, I formulated the heart of Dawkins' argument as a syllogism and then, with the help of an email exchange with several colleagues, especially William Lane Craig, I revised it to the following form:

1. A more complex world is less probable than a simpler world.
2. A world with God is more complex than a world without God.
3. Therefore a world with God is less probable than a world without God.

After circulating this form, I did get the obviously hurried reply from Dawkins: “Your three steps seem to me to be valid. Richard Dawkins [sic]” (1 February 2007).

Now that I have summarized Dawkins' basic argument in a brief form that he seems to agree with, modulo typos, one can ask whether Dawkins is right. The conclusion of the syllogism seems to follow from the two premises (or at least I have intended this to be the case), so it is a question of whether the premises are correct.

One might question whether complexity is improbable, an unproved assumption. There is also the fact that complexity depends on background knowledge and may be only subjective. For example, David Deutsch [10] has emphasized to me that “complexity cannot possibly have a meaning independent of the laws of physics. ... If God is the author of the laws of physics (or of an overarching system under which many sets of laws of physics are instantiated—it doesn't matter) then it is exclusively God's decision how complex anything is, including himself. There neither the idea that the world is ‘more complex’ if it includes God, nor the idea that God might be the ‘simplest’ omnipotent being makes sense.”

This argument makes sense to me, but it did have the effect of shaking my fundamentalist physicist faith in the simplicity of the laws of nature. However, more recently Deutsch has pointed out [11] that these considerations do not mean that the concept of the simplicity of the laws of physics is circular: “I don't think it's circular, because the fact that simplicity is determined by the laws of physics

does not mean that all possible laws are ‘simple’ in their own terms.” So I suppose one might still ask whether in a universe apparently governed by simple laws of physics, God appears to be simple. However, since as Deutsch notes, God could have made Himself appear to have arbitrary complexity, it is a bit dubious to say that His probability is determined by His complexity.

Nevertheless, since we scientists (and indeed most others) prefer hypotheses that are ultimately simple, we might for the sake of argument grant the first premise I have ascribed to Dawkins and ask whether the second premise is correct. Again Deutsch’s comments should lead us to be cautious in drawing such conclusions.

However, even if we take the naïve view that one can define the complexity of God (say with respect to the laws of physics in our universe), then it is still not obvious that God is complex, or that He would add complexity to the world. Perhaps God is indeed simple [12].

If God were necessary, then He would have no complexity at all, because no information would be needed to specify Him. Even if God were contingent, He might be simple. For example, perhaps God is the best possible being (assuming sufficient background knowledge that this apparently simple definition uniquely specifies some possible entity, though it is certainly unclear that our background knowledge within this universe is sufficient for this). Even if it is not necessary for such a God to exist, He might be simple (if simplicity can indeed be defined).

Even if one concedes that the philosophical idea of God might be simple, there is the question of whether God is simple in traditional monotheism. At first sight, the God of the Bible and of the Koran seems complex. But analogously, Earth’s biosphere seems complex. However, the full set of biospheres arising by evolution in a huge universe or multiverse with simple laws of physics might be simple. Similarly, the limited aspects we experience of God might be complex, but the entirety of God might be simple.

I mentioned near the beginning of this paper that one reason that humans developed the conception of gods or God was to try to get a simple explanation of their observations and experiences in terms of willful causal agents. Now with the growth of a rather mechanistic view of the universe in science, reasons have arisen

to doubt the existence of willful causal agents within the universe. For example, if quantum theory gives a complete description of the physical universe and does not have any collapses of the wavefunction that would violate the quantum laws of unitary evolution, there does not seem to be much room for incompatibilist free will within the universe (though I suppose one could postulate that free will agents could help choose the quantum state and its evolution). Also, in physics causality applies equally forward and backward in time, so there seems to be no fundamental distinction between cause and effect. Thus, one might doubt the usual assumption of a unidirectional causation in which it is clear what the causes are and what are the effects.

These two reasons for doubting the fundamental existence of willful causal agents within the universe might be interpreted as attacks on the scaffolding humans have used to extrapolate to the concept of God as the ultimate willful causal agent. Indeed such arguments do lead me to question arguments from willful causation to the existence of God. However, it has also occurred to me that the concept of God as the ultimate willful causal agent may be correct even if the scaffolding we have used to arrive at this concept is incorrect. What if God as the personal Creator of the universe created us in His image, not as truly having free will in the incompatibilist sense and being truly causal agents, but as beings whose thoughts and actions mirror God's true free will and causation? God might have created us to experience some of the feelings that He has as a willful causal agent, even though for us those feelings would be somewhat illusory, in that we ourselves do not really have free will (at least in the incompatibilist sense) and are not really the cause of anything, since (in what I regard as the simpler view) it is only God that is the true cause of everything.

## 4 Summary

In conclusion, I believe both religion and science share a common underlying unproved faith in simplicity. One might argue that the assumption of simplicity has proved itself by working in the past. But this argument depends on the assumption that what has worked in the past is true and will work in the future, which is essen-

tially a special case of the assumption of simplicity that I am arguing is not proved. Of course, one can take the experience of its working in the past as evidence for its truth, just as one can take religious experience as evidence for the truth of religious beliefs, but ultimately one cannot prove this assumption and can only accept it by faith.

Without something like this faith in simplicity, one can hardly claim to know anything, so I would say that our epistemology implicitly depends upon this unproved faith. Although it is not quite the same thing, this faith in simplicity as the basis for knowledge seems somewhat analogous to what is written in Proverbs (1:7, 9:10, and 11:10) about faith in God and moral understanding: “The fear of the Lord is the beginning of wisdom.”

## Acknowledgments

I am indebted to discussions with Andreas Albrecht, Denis Alexander, Stephen Barr, John Barrow, Nick Bostrom, Raphael Bousso, Andrew Briggs, Jeffrey Brower, Peter Bussey, Bernard Carr, Sean Carroll, Brandon Carter, Kelly James Clark, Gerald Cleaver, Francis Collins, Robin Collins, Gary Colwell, William Lane Craig, Paul Davies, Richard Dawkins, William Dembski, David Deutsch, the late Bryce DeWitt, Michael Douglas, George Ellis, Debra Fisher, Charles Don Geilker, Gary Gibbons, J. Richard Gott, Thomas Greenlee, Alan Guth, James Hartle, Stephen Hawking, Rodney Holder, Chris Isham, Werner Israel, Renata Kallosh, Klaas Kraay, Karel Kuchař, Denis Lamoureux, John Leslie, Andrei Linde, Robert Mann, Don Marolf, Alister McGrath, Ernan McMullin, Tom Nagel, Gerard Nienhuis, Andrew Page, Cathy Page, John Page, Gary Patterson, Alvin Plantinga, Chris Polachic, John Polkinghorne, Martin Rees, Hugh Ross, Henry F. Schaefer III, Paul Shellard, James Sinclair, Lee Smolin, Mark Srednicki, Mel Stewart, Jonathan Strand, Leonard Susskind, Richard Swinburne, Max Tegmark, Donald Turner, Neil Turok, Bill Unruh, Alex Vilenkin, Steven Weinberg, Robert White, and others whom I don’t recall right now, on various aspects of this general subject, though the opinions expressed herein are my own. My own scientific research is supported in part by the Natural Sciences and Research Council of Canada.

## References

- [1] Richard Dawkins, *The God Delusion* (Houghton Mifflin, Boston, 2006).
- [2] Reijer Hooykaas, *Religion and the Rise of Modern Science* (Regent College Publishing, Vancouver, 2000).
- [3] Thomas Aquinas, *Summa Theologia* (Cambridge University Press, Cambridge, 1990).
- [4] Robert G. Wilson, Sequence A005349 in N. J. A. Sloane, ed., *The On-Line Encyclopedia of Integer Sequences* (2008), published electronically at <http://www.research.att.com/~njas/sequences/A005349>.
- [5] James A. Sellers and Michel Lecomte, Sequence A002473 in N. J. A. Sloane, ed., *The On-Line Encyclopedia of Integer Sequences* (2008), published electronically at <http://www.research.att.com/~njas/sequences/A002473>.
- [6] Myron Lecar, Fred A. Franklin, Matthew J. Holman, and Norman W. Murray, “Chaos in the Solar System,” Annual Review of Astronomy and Astrophysics **39**, 581-631 (2001).
- [7] Leonard Susskind, *The Cosmic Landscape: String Theory and the Illusion of Intelligent Design* (Little, Brown and Company, New York, 2006).
- [8] Alex Vilenkin, *Many Worlds in One: The Search for Other Universes* (Hill and Wang, New York, 2006).
- [9] Bernard Carr, editor, *Universe or Multiverse?* (Cambridge University Press, Cambridge, 2007).
- [10] David Deutsch (private communication, Jan. 22, 2007).
- [11] David Deutsch (private communication, Sept. 29, 2007).
- [12] Richard Swinburne, *The Existence of God* (Clarendon, Oxford, 1991).